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## RECORD OF REVISION

Rev	Date	Description	POC	OIC
0	06/28/99	Rewritten to support LIR220-03-01, FEM, superseding Facilities Eng Standards Index and Procedures, Vol 1, Rev 7, dated 7/17/98.	Mike Nicolini, <i>FWO-FE</i>	Dennis McLain, <i>FWO-FE</i>
1	04/26/00	Added TRB to approval process, I&C Chapter; addressed SC/SS design requirements. Admin requirements changed to address the FEM and Construction Specs but not Drafting Manual.	Tobin H. Oruch, <i>FWO-SEM</i>	Mitch Harris, <i>FWO-SEM</i>
2	09/26/01	FEM now LEM; POCs now Tech Committee Chairs and AHJs; Ch 1 Tech Comm created; periodic review changed from 2 years to 3; Drafting Manual applicability restored; other minor clarifications throughout.	Tobin H. Oruch, <i>FWO-SEM</i>	Mitch Harris, <i>FWO-SEM</i>
3	05/22/02	Stds Mgr approval of specs, std details, and quals vice OIC; added AE and other non-voting committee members; clarified Ch. 1 oversight by POCs and Tech Committee; QA Rep as non-voting TRB member; org name changes.	Tobin H. Oruch, <i>FWO-SEM</i>	Kurt Beckman, <i>FWO-SEM</i>

The LANL Engineering Manual (LEM), OST220-03-01-EM, addresses requirements of [LIR 220-03-01](#), LANL Engineering Manual. It provides both mandatory requirements and guidance. The LEM also invokes two companion manuals:

- The LANL Construction Specifications Manual (LCSM), OST220-03-01-CSM, and
- The LANL Drafting Manual, OST220-03-01-DM.

LEM Chapter 1 contains general material applicable to all disciplines including this section which is an administrative procedure governing manual administration (maintenance).

## **BACKGROUND**

The Work Smart Standards (WSS) contain provisions considered necessary to safety. Compliance with the WSS and proper maintenance will result in installations with minimal hazards, but not necessarily efficient, convenient or adequate for changing mission requirements.

The purpose of the LANL Engineering Manual (LEM) is to establish a formal system to control the initiation, preparation, revision, and approval of engineering requirements relative to the national codes, standards and directives listed in Appendix G of the DOE/UC contract and unique site-specific engineering criteria. The establishment of the LEM thus provides a method for LANL's compliance to the WSS and a consistent level of quality in the design, construction, and maintenance of Laboratory systems, structures, and components.

The arrangement of chapters in the LANL Engineering Manual is:

Chapter 1:	General
Chapter 2:	Fire Protection
Chapter 3:	Civil
Chapter 4:	Architectural
Chapter 5:	Structural
Chapter 6:	Mechanical
Chapter 7:	Electrical
Chapter 8:	Instrumentation and Control
Chapter 9:	Security (future)

## **1.0 INTRODUCTION**

### **1.1 Purpose**

This section implements a formal system to address LANL specific engineering requirements relative to the national codes, standards, and directives listed in Appendix G of the DOE/UC contract and unique site-specific engineering requirements. This section is to be maintained as part of the LEM in accordance with the LIR220-03-01, LANL Engineering Manual. Use of this section ensures that:

- Site-specific engineering requirements relative to the national codes and standards listed in Appendix G of the DOE/UC contract are addressed;
- Suitable national codes and standards are adopted to support safety class and safety significant design requirements;
- A formal process is implemented to control the initiation, interpretation, preparation, revision and approval of engineering requirements;
- Authority and responsibilities for the LEM are established;
- Personnel who participate in the development of LEM requirements are qualified;
- A Technical Review Board is established for the final acceptance of codes and standards;
- The LANL Construction Specifications Manual (LCSM) is revised commensurate with the revisions made to the LEM;
- A Drafting Manual is maintained;
- Revisions are posted on the Standards website;
- Notification and issuance of LEM revisions are made;
- Reaffirmation reviews of the LEM take place within 3 years of last revision; and
- Appropriate records are identified and retained.

### **1.2 Scope**

#### **1.2.1** The scope of this section includes the administrative controls for the LEM, LCSM, and Drafting Manual.

- The LEM defines the minimum engineering design requirements for structures, systems, and components at LANL. Organizations responsible for the design of LANL structures, systems, and components are responsible for ensuring that their Design Agent implements the stated requirements. This not only includes new construction, but modification of existing systems as well.
- The LCSM, as a minimum, implements and communicates the LEM technical requirements in the form of Construction Specification Institute (CSI) MasterFormat specifications for project use.
- The Drafting Manual provides requirements for facility drawings.

## 2.0 ACRONYMS AND DEFINITIONS

### 2.1 Acronyms

<b>A/E</b>	Architect/Engineer
<b>AHJ</b>	Authority Having Jurisdiction
<b>CSI</b>	Construction Specifications Institute
<b>DOE</b>	Department of Energy
<b>FM</b>	Facility Manager
<b>FMU</b>	Facility Management Unit
<b>FWO-SEM</b>	Facility and Waste Operations – Systems, Engineering, & Maintenance Group
<b>HSR</b>	Health, Safety, and Radiation Protection Division
<b>LCSM</b>	LANL Construction Specifications Manual
<b>LEM</b>	LANL Engineering Manual
<b>OIC</b>	Office of Institutional Coordination
<b>OST</b>	Operations Support Tool
<b>POC</b>	Point of Contact (LEM discipline-specific unless otherwise noted as LANL-wide)
<b>PM</b>	Project Management Division
<b>PS</b>	Performance Surety Division
<b>QMP</b>	Quality Management Procedure
<b>RRES</b>	Risk Reduction and Environmental Stewardship Division
<b>SME</b>	Subject Matter Expert
<b>UC</b>	University of California
<b>WSS</b>	Work Smart Standards

### 2.2 Definitions

**Approval Authority.** Approval authority refers to the person who holds a title, position, or office that can approve engineering requirement issues.

**Alternate Method.** A deviation from an LEM or other document that includes compensatory measures that assures the objectives of safety, constructability, operability, and maintainability.

**Application Matrix.** A table of codes and standards to be applied to equipment and/or technical topics based upon service classification.

**Architect Engineer (A/E).** The design service supplier responsible for producing design documents.

**Authority Having Jurisdiction.** The organization, office, or individual responsible for approving equipment, an installation, or procedure. (Ref: NFPA Fire Prevention Code Handbook, Chapter 2, First Edition, 1998).

**Clarify.** To make the LANL Engineering Manual or referenced code understandable and free from confusion through a written process.

**Design Agent.** The LANL organization or subcontractor (A/E) responsible for the preparation of engineering design and documentation.

**Design Documents.** Those documents which describe the physical configuration and design requirements of the facility. Typically these documents include calculations, drawings, and specifications.

**Discipline Point of Contact (LEM POC).** The LANL subject matter expert responsible for a discipline-specific chapter of the LEM and all associated specifications. There is also a POC for the Drafting Manual.

**Exception.** An implementation relief from all or a part of the requirements stated in the LEM or referenced code.

**Industry Events.** Significant events recorded and summarized in LANL Occurrence Reports and DOE Lesson Learned files.

**Institutional Standards.** The LANL Institutional Standards include those referenced in the DOE/UC LANL contract, [Appendix G](#), called the [Work Smart Standards \(WSS\) set](#); the LANL [Laboratory Performance Requirements \(LPRs\)](#); and the [Laboratory Implementing Requirements \(LIRs\)](#) that implement those WSSs.

**Interpret.** To provide a written, acceptable method of compliance with the LEM or referenced code.

**LANL Drafting Manual.** A manual that sets the criteria for drafting (graphic) conventions for creating or modifying drawings for LANL facilities construction projects and revision of those drawings. The manual number is OST220-03-01-DM.

**LANL Engineering Manual (LEM).** A manual, arranged by discipline-specific chapters, that includes engineering requirements relative to national codes and standards listed in Appendix G of the DOE/UC contract and justifiable unique site-specific engineering requirements. The manual number is OST220-03-01-EM.

**LANL Construction Specifications Manual (LCSM).** A manual that prescribes the supply, installation, and performance requirements for construction and modification projects. The manual number is OST220-03-01-CSM.

**Operations Support Tool (OST).** A manual or other document that contains material that supports an LPR or LIR, but is not suitable for a LIG (e.g., due to presence of requirements).

**Record.** Recorded information of any kind in any form maintained because it furnishes evidence of quality of items and/or activities affecting safety or compliance to specified requirements.

**Subject Matter Expert.** Any individual with acknowledged expertise in a given subject.

**Variance.** A deviation from the explicit expectations contained in the LEM or referenced code.

[Work Smart Standards \(WSS\)](#). The set of standards identified in the DOE/UC LANL contract, Appendix G. Also known as Institutional Standards.

### **3.0 RESPONSIBILITIES**

#### **3.1 Division Leaders, Program Directors, Office Directors, or their Designees**

- Ensures participation by selected personnel implementing this section

#### **3.2 FWO-SEM Group Leader**

- Ensures this section is properly implemented
- Serves as Chairperson of the TRB
- Approves revisions of the LEM as the Office of Institutional Coordination (OIC)
- Appoints special advisory committees as necessary

#### **3.3 FWO-SEM Standards Manager**

- Manages overall standards program including schedule, budget, and resource loading
- Collects and distributes comments and recommendations for LEM technical requirement changes to the respective Technical Committees
- Works with the POCs to secure the necessary SME involvement when such needs are identified
- Coordinates LEM issues affecting more than one Technical Committee
- Serves as TRB Secretary and documents TRB decisions
- Handles project-specific standards identification inquiries
- Serves as POC for LEM Chapter 1
- Oversees webposting and recordkeeping of approved documents
- Maintains a Quality Assurance Plan for the program/process

#### **3.4 Discipline Point of Contact (POC)**

- Functions as the Technical Committee Chair
- Sets the Technical Committees agenda and meeting schedules
- Performs as the senior technical lead within the respective Technical Committee
- Works with the SEM Standards Manager to secure the necessary SME involvement when such needs are identified
- Responds to requests for clarification, interpretation, variance, and exception to LEM/LCSM/DM requirements
- Identifies cross-references between LEM requirements that could be affected by the proposed technical requirement changes

- Identifies and prepares changes to the LCSM and Standard Details resulting from LEM technical requirement changes
- Documents the Technical Committee recommendations
- Prepares LEM technical requirement changes for LEM incorporation
- Presents proposed LEM changes to the TRB
- Depending upon the subject matter and the authority vested, the POC may also be the AHJ

### 3.5 Technical Committee Members and Alternates

- Participates in Technical Committee meetings
- Ensures that recommended changes to the LEM and LCSM are technically reviewed in a prompt manner when requested
- Interacts with other Technical Committee members and Subject Matter Experts (SMEs) for determination of LEM requirements/guidance
- Documents comments, recommendations, and technical bases regarding LEM requirements

### 3.6 Subject Matter Expert (SME)

- Advises POC in specific areas of expertise
- If requested, provides independent review of proposed LEM technical requirement changes
- Provides technical recommendation for or against proposed LEM technical requirement changes
- Supports and participates in the Technical Committee meetings as requested by the POC

### 3.7 Technical Review Board (TRB) Members and Alternates

- Considers the overall potential impact of LEM technical requirement changes on LANL mission and performance goals
- Performs final review and approval of proposed technical requirement changes to the LEM

### 3.8 Quality Assurance Representative

- Performs QA reviews of any material promulgated for or affecting safety-related work (ML-1, ML-2, SC, SS) (*typically the LEM but not specifications or Drafting Manual*), and any Program Documents addressing quality such as the QA Plan. A non-voting member of the TRB.

### 3.9 Administrative Assistant/Program Admin

- Performs editing and assists with review, archiving, and webposting processes.

## **4.0 PROCEDURAL STEPS**

### **4.1 Background**

- 4.1.1** This section provides for the selection, review and revision of technical requirements to be applied in the development of new LANL systems and the maintenance and modification of existing systems.
- 4.1.2** These requirements are consolidated, by discipline, into respective chapters of the LEM. The sources for these requirements include the WSS, Appendix G of the DOE/UC contract, existing codes and standards from previous facility project baselines, proposed codes and standards from new facility projects, and requested changes resulting from facility maintenance and modification activities. The establishment of the LEM thus provides a method for LANL's compliance to the WSS and a consistent level of quality in the design, construction and maintenance of Laboratory facilities.
- 4.1.3** The LCSM is developed following the latest CSI MasterFormat for project and maintenance modification use and, as a minimum, promulgates the LEM technical requirements and provides a consistent and uniform means to develop project specifications.
- 4.1.4** The LANL Drafting Manual is maintained in a manner similar to the LEM Discipline chapters. When drafting work is within its scope description, its use is required.

### **4.2 Methodology**

- 4.2.1** The process of selection, review, and approval of technical requirements for inclusion into the LEM utilizes the concepts of:
- A SEM Standards Manager for overall program management and coordination
  - Single-point contacts (POCs) for each discipline (e.g., Mechanical, Civil, Electrical, etc.)
  - Technical Committees of technically competent individuals assigned per discipline representing the experience and diverse backgrounds of HSR, PM, PS, RRES, FWO, and the FMUs
  - Subject matter experts on an as-needed basis
  - A TRB to conduct a final review and approval of changes to the LEM
- 4.2.2** This section ensures that appropriate technical requirements are identified and integrated into the LEM as they are needed. This section also requires formal change control for controlling LEM revisions.
- 4.2.3** The process is summarized as follows:
- Technical requirement inputs, such as specified by WSS, capture of existing facility codes and standards, new facility project requirements, and requested changes resulting from facility maintenance and/or modification activity requirements are collected by the SEM Standards Manager and forwarded to the respective POC.
  - Furthermore, when technical requirements are recognized to support compliance with safety class and safety significant design requirements, these relationships are documented in the LEM.

- Working with the SEM Standards Manager, the POC convenes meetings of the Technical Committees as appropriate to review proposed changes to the LEM and assist documents those recommendations.
- As necessary, the Technical Committee through the POC may request input from one or more SMEs to aid in preparation of the technical requirement recommendations.
- Broader review by the Lab (e.g., via [POC@lanl.gov](mailto:POC@lanl.gov) and [FM@lanl.gov](mailto:FM@lanl.gov) listserves) is required when requirements on programs (vs. facilities) are involved, and is recommended at all times.

**4.2.4** When requested by the POC, the SEM Standards Manager arranges for the presentation of the recommended LEM changes to the TRB for final approval. The TRB, upon completion of the review, may accept or reject the recommendation. If rejected, the technical requirement recommendation is returned to the responsible Technical Committee for resolution. If accepted, the POC prepares the section for incorporation into the LEM. Refer to Attachment 1, LEM Manual Administration Flow Diagram,

**4.2.5** Issues such as clarifications and interpretations may be directly responded to by the POC.

**4.2.6** Revisions to the LCSM, Drafting Manual, and LEM Standard Details are administratively controlled in an identical fashion to the LEM with the exception that the LCSM and Standard Detail revisions do not require TRB approval; Standards Manager approval is sufficient for these implementing documents. Similarly, administrative changes that do not increase the cost or impact or requirements can be made with the approval of the Standards Manager. Examples include grammatical and other error corrections, clarifications, organizational name changes, etc. These can be issued as a new revision or as a Change (e.g., Chg 1) to a revision.

**4.2.7** Under no circumstances shall the LCSM be revised to conflict or take exception to the LEM.

### **4.3 Selection of Key Standards Program Personnel**

**4.3.1** The Technical Committees, TRB, POCs and SMEs are selected such that the composition of individuals and requisite expertise results in a broad representation of technical disciplines and subject areas. The Technical Committees are to be composed of knowledgeable individuals from the various stakeholder organizations. The following membership is recommended, as a minimum:

- **Point of Contact (LEM Discipline POC)**

The FWO-SEM Group Leader appoints a POC knowledgeable in the respective discipline area. The POC is the senior technical expert on the Technical Committee. The POC is ideally a prime contractor (e.g., UC) employee and registered professional engineer or architect with 10 years experience. The qualifications of each POC shall be documented using Appendix B, "LEM Personnel Qualification Record."

- **Technical Committee and Alternates**

Nominally has representatives from FWO, FMUs, PM, PS, RRES, and HSR, knowledgeable in the respective discipline area and meeting the qualification requirements specified in Appendix B, “LEM Personnel Qualification Record” and documented using same. AE firms may also participate as can those not meeting the 5-year requirement of Appendix B; however, such personnel have non-voting status. Each Technical Committee is organized and run by the Discipline POC. *The Chapter 1 committee should include field personnel with CM experience and POCs for equipment-related disciplines (Mechanical, Electrical, and I&C). Chapter 1 Section 100 revisions should only be reviewed by the POCs.*

- **TRB and Alternates**

The TRB is chaired by the FWO-SEM Group Leader and nominally includes Group or Division Leaders from the following organizations: FMC, HSR-5, PM, PS, FWO-FIRE, FWO-CFS, FWO-UI, and RRES (they are assumed qualified by virtue of their positions). The QA Representative is a non-voting member of the TRB. The TRB members and alternates shall be independent of the Technical Committees and SMEs to the extent possible; Tech Committee personnel acting as a TRB member/alternate shall abstain from voting on that committee’s recommendations to avoid a conflict of interest.

- **SEM Standards Manager**

The FWO-SEM Group Leader appoints a SEM Standards Manager, ideally, an engineer or architect having over 10 years experience in the use of codes and standards. The qualifications of the SEM Standards Manager are documented using the format in Appendix B. He may be assisted by a Standards Engineer, Architect, or Coordinator who, if delegated authority, shall meet the same qualifications.

- **SMEs**

SMEs are called upon at large by POCs for their expertise on a particular subject, meeting the qualification requirements specified in Appendix B, LEM Personnel Qualification Record and documented with same.

#### **4.4 Review, Acceptance, and Approval of Proposed LEM Requirement Changes**

##### **4.4.1** Technical change requests may be presented as

1. WSS-driven,
2. New project-related requirements,
3. Capture of existing facility requirements,
4. Proposed alternate methods, and/or
5. Industry events and lessons learned.

##### **4.4.2** *Input from industry events should be evaluated periodically for impact to the LEM. LANL Occurrence Reports, DOE Lesson Learned, and Issues Tracking I-Track system should be reviewed by the SEM Standards Manager on a quarterly basis for potential input into the maintenance of the LEM.*

**4.4.3** The Technical Committee convenes as requested by the POC (*should also involve the SEM Standards Manager*) and reviews the changes provided by the POC for consideration into the LEM. The POC documents their review and provides a written technical evaluation and recommendation for incorporation into the LEM or basis for rejection. This review is to:

1. Determine if incorporation of the technical requirement is necessary and prudent to achieve compliance to the WSS;
2. Ensure a level of quality and consistency in the design, construction and maintenance of LANL facilities; and
3. Capture existing facility technical requirements not presently in the LEM, but based on the review, should be.

*Additional factors such as life-cycle costs associated with a technical requirement change, associated impacts to other disciplines, environmental impact, and compliance issues pertaining to nuclear safety class and safety significant requirements should also be considered.*

The basis (justification) for all new or revised requirements and guidance in the LEM not immediately obvious to the untrained shall be captured in an endnote, especially those technical requirements implementing Federal/State mandates or commitments made to regulatory agencies as the result of inspections, audits, or accident investigations. *Bases for LCSM and Standard Detail requirements should be filed in the LCSM files.*

*Appendix C, LEM Change Proposal, should be used to document the Technical Committee review, evaluation, and technical requirement change recommendation.*

- 4.4.4** A majority of active Technical Committee members or alternates is required to proceed with a technical requirement change. The Technical Committee bases decisions upon simple majority rule with ties broken by the Chairman. Non-voting members and SMEs have an advisory capacity and cannot vote on Technical Committee decisions.
- 4.4.5** Per [LIR 220-03-01](#), programmatic requirements must receive consensus approval of LANL POCs prior to issuance (they must also be specifically identified in the Manuals as programmatic). *Such labwide review is recommended for all substantial changes regardless of programmatic impact.*
- 4.4.6** Based on the review outcome, the POC either returns the rejected technical requirement change back to the originator with explanation or presents the draft revised section to the TRB for approval in coordination with the SEM Standards Manager.
- 4.4.7** The TRB, as requested by the respective POC via the SEM Standards Manager, convenes to accept or reject the technical requirement recommendations. The TRB decision is documented on Appendix D, LEM TRB Meeting Attendance and Voting Record. The quorum for the TRB to convene is a minimum of five (5) members. The TRB decision for acceptance/rejection is by simple majority rule and is to be based on the same factors given above, along with any considerations for long-term, broad-based impact to LANL mission and performance goals. Rejections are to be returned to the respective Technical Committee for resolution.
- 4.4.8** If accepted by the TRB, the POC works closely with the SEM Standards Manager to prepare the technical requirement change into the proper format for incorporation into the LEM, and submit the LEM revision to the TRB Chairman for approval signature via Appendix A. As the TRB Chairperson, the FWO-SEM Group Leader (as OIC) signs as “Approved” for the LEM revision.

- 4.4.9 Changes to the LCSM and Standard Details resulting from the proposed LEM technical requirement change shall be identified by the POC. *These should be forwarded to the respective Technical Committee for review prior to optional, broader review.* Approval of POC and Standards Manager shall be documented on Appendix A and filed.

#### 4.5 Interpretations and Clarifications

- 4.5.1 Manual users shall submit requests in writing to the appropriate POC if a written response is desired. E-mail links on the Standards webpages shall be maintained to facilitate easy communication with the POCs.
- 4.5.2 *The POCs can also act as AHJ for clarification and interpretation requests within their discipline on order and national codes, and standards when no other LANL-appointed AHJ exists (further discussed in LIR220-03-01).*
- 4.5.3 When interpretation or clarification e-mails or paper requests reach the appropriate POC(s), they shall be responded to promptly and in writing.
- 4.5.4 The POC for each respective Technical Committee may respond immediately to interpretations and clarifications, or first call upon the assistance of the respective Technical Committee. *Responses should be copied to the Tech Committee and LEM Standards Manager.*
- 4.5.5 *Interpretations and clarifications of general interest to LANL should be documented using Appendix E or similar format and posted on the Standards website via the SEM Standards Manager.*

**NOTE:** See Table 100-1 for summary of clarification and variance processes.

#### 4.6 Variances and Exceptions

- 4.6.1 Variances and exceptions to the LEM proper are outside the scope of this section and shall be processed in accordance with [LIR301-00-02](#), “Variances and Exceptions to Laboratory Operations Requirements.”
- 4.6.2 Exceptions to the LCSM, Drafting Manual, and LEM Standard Details (ST drawings) may be granted in writing by the discipline POC in a manner similar to the interpretation process described above (i.e., without following LIR301-00-02).
- 4.6.3 *All general-interest (non-project-specific) variance and exception data should be posted for viewing on the LANL web until such time the exception or variance no longer physically exists, or the LEM is revised to incorporate the exception or variance. Project-specific variance and exception data should also be posted (postings may be via PS-Operations Integration homepage).*
- 4.6.4 *Exceptions or variance dispositions for planned incorporation into the LEM should indicate such plans in the web posting.*

**TABLE 100-1, Clarification/Alternate/Variance Approval Levels**

	LANL Construction Spec, Drafting Manual, or LEM Standard Detail		LANL Engineering Manual (except Standard Details)		Work Smart Standard	
	Approve/Issue	Appeal	Approve/Issue	Review/Appeal	Approve/Issue	Appeal
<b>Clarification or Interpretation</b>	LEM Discipline POC	LEM Discipline Technical Committee or Standards Mgr	LEM Discipline POC	LEM Discipline Technical Committee	AHJ	LD-appointed AHJ or LEM Technical committee
<b>Alternate Method</b>	LEM Discipline POC	LEM Discipline Technical Committee or Standards Mgr	LEM Discipline POC	LEM Discipline Technical Committee or Standards Mgr	LD-appointed AHJ or LEM Technical committee	Laboratory Director
<b>Variance or Exception</b>	LEM Discipline POC	LEM Discipline Technical Committee or Standards Mgr	LIR301-00-02	Lab Director (LD)	DOE OLASO	DOE HQ

#### 4.7 Manual Distribution and Control

- 4.7.1** The LEM Standards Manager ensures that the revised LEM, LCSM, or Drafting Manual section is posted on the Standards webpage within 10 working days of approval and then issues an electronic memo notifying all organization users of the revised manuals. *This is typically done monthly via e-mail to [POC@lanl.gov](mailto:POC@lanl.gov), [FM@lanl.gov](mailto:FM@lanl.gov), and an additional list of those specifically requested such notification.*
- 4.7.2** See LIR220-03-01, LANL Engineering Manual, for implementation requirements for projects and new requirements.

#### 4.8 Assessments

- 4.8.1** Assessments shall be performed as scheduled by the AA-2 Auditing Group and/or FWO-SEM.
- 4.8.2** Feedback or improvement suggestions regarding this section can be made via e-mail link on the website or paper submission to FWO-SEM, M/S M702, Attn: Eng Standards Manager.

### 5.0 REQUIRED RECORDS

#### 5.1 Responsibilities

- 5.1.1** The SEM Standards Manager shall ensure electronic, back up, and hardcopy files of the LEM, LCSM, and Drafting Manuals are maintained.
- 5.1.2** Technical Committees and the TRB shall submit the following documents to the SEM Standards Manager for long term archival:
- LEM Personnel Qualification Records
  - LEM Change Proposals
  - LEM TRB Meeting Attendance and Voting Record

### 6.0 CHAPTER FORMAT

For format matters see LEM Chapter 1, Section 110, LEM Writer's Guide.

### 7.0 REFERENCES

- LPR220-03-00, Facility Projects -- Engineering Design
- LPR220-05-00, Facility Projects – Project Execution
- LPR220-06-00, Life Cycle Asset Management – Project Management and Asset Acquisition
- LIR220-03-01.1, LANL Engineering Manual
- LIR301-00-02, Variances and Exceptions to Laboratory Operations Requirements
- OST220-03-01-CSM, LANL Construction Specifications Manual
- OST220-03-01-DM, LANL Drafting Manual

**8.0 APPENDICES**

Appendix A:	LEM Signature Sheet
Appendix B:	LEM Personnel Qualification Record
Appendix C:	LEM Change Proposal
Appendix D:	LEM TRB Meeting Attendance and Voting Record
Appendix E:	LEM Clarification/Interpretation Request

**9.0 ATTACHMENTS**

Attachment 1: Manual Administration Flow Diagram (*print 11 x 17*)

**APPENDIX A  
SIGNATURE SHEET FORMAT**

<b>LANL</b> Engineering Manual	Chapter X - Title
Section XXX - Signature Sheet	Rev. #, Date
<b>SIGNATURE SHEET</b>	
Submitted by:	<div><div><div></div><div><i>Name of Discipline POC</i></div></div><div><div></div><div><i>Date</i></div></div></div>
Reviewed by:	<div><div><div></div><div><i>Tobin Oruch, LEM Standards Manager</i></div></div><div><div></div><div><i>Date</i></div></div></div>
QA Concurrence:	<div><div><div></div><div><i>Jim Narron, FWO QA Representative</i></div></div><div><div></div><div><i>Date</i></div></div></div>
Approved by:	<div><div><div></div><div><i>Kurt Beckman, Acting Group Leader, FWO-SEM; OIC &amp; Technical Review Board</i></div></div><div><div></div><div><i>Date</i></div></div></div>
<hr/>	
<b>Reason for Revision/New:</b>	
<hr/>	

**APPENDIX B****Name:****Position Title:** *Various***General Requirements:**

Personnel performing functions as Technical Committee members, Technical Review Board members, POCs, SMEs, or SEM Standards Manager or Coordinator should understand the technical aspects of nuclear and non-nuclear facility designs, including the LANL technical missions, and hazards associated with the LANL mission activities. Personnel shall be capable of discharging the procedural responsibilities with the specific goal of performing technical reviews and judgements in regard to technical requirement changes to the LEM. [Ref. LANL Engineering Manual]

**Minimum Qualifications:**

All personnel working within the LEM procedure shall hold a bachelor or advanced degree in an engineering, physical science field, or an equivalent combination of work experience and education, and shall have a minimum of five (5) years technical experience in one or more areas listed as follows:

- a) Nuclear and/or non-nuclear industrial facility design, construction, or operations
- b) Application of a recognized engineering discipline (mechanical, electrical, nuclear, instrumentation and control, etc.)
- c) Application of system engineering, including the monitoring, maintenance or operation of nuclear and/or non-nuclear industrial facilities

**I have evaluated the qualifications of:** \_\_\_\_\_ [name/date], or attached list of LEM personnel having resumes on file.

**And certify that this individual's education and experience are commensurate with the requirements specified within this form for the expressed purpose for working in accordance with the above referenced procedure.**

Standards Manager: \_\_\_\_\_

Print name/signature

Date: \_\_\_\_\_

## APPENDIX C

<b>Technical Requirement Change Description:</b>
<b>Work Smart Standard:</b>
<b>LANL Facility(s):</b>
<b>Technical Discipline:</b>
<b>Facility Life Cycle, Constructions Specifications, or other considerations:</b>
<b>Technical Evaluation:</b>
<b>Recommendation:</b>
<div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="width: 60%;"> <b>Technical Committee Member:</b> _____  <div style="text-align: center; margin-top: 5px;">Print name/signature</div> </div> <div style="width: 35%;"> <b>Date:</b> _____ </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="width: 60%;"> <b>Standards Manager:</b> _____  <div style="text-align: center; margin-top: 5px;">Print name/signature</div> </div> <div style="width: 35%;"> <b>Date:</b> _____ </div> </div>

APPENDIX D

TRB Meeting Attendance and Voting Record

Date \_\_\_\_\_

Voting

		Quorum=5		Initial under "Yea" or "Nea;" motions 1-4 below								
TRB Members	Initial if Present	Alternates	Initial if Present	Org	1		2		3		4	
					Y	N	Y	N	Y	N	Y	N
				FWO-SEM								
				HSR								
				RRES								
				FWO-FIRE								
				FMC								
				FWO-UI								
				PS								
				PM								
				FWO-CFS								
<b>POCs</b>				<b>VOTE</b>	<b>TOTALS</b>							
				<b>PASS (P) FAIL (F)</b>								
<b>Other Attendees</b>												
1					1 _____							
2					2 _____							
3					3 _____							
4					4 _____							
5					5 _____							
6					6 _____							
7					7 _____							

Motion Descriptions

## Appendix E

<b>LEM Chapter:</b> <b>Technical Discipline:</b> <b>Section(s):</b>
<b>Petitioner:</b>
<b>Inquiry:</b>
<b>Existing wording:</b>
<b>Clarification</b> ____ <b>Interpretation</b> ____
<b>Technical Committee POC:</b> _____ <b>Date:</b> _____ <div style="text-align: center;">Print/Signature</div>
<b>Distribution (via e-mail):</b> <b>Petitioner:</b> _____ <b>Standards Manager:</b> _____

